The documentation and process conversion measures necessary to comply with this revision shall be completed by 26 April 2011.

INCH-POUND

MIL-PRF-19500/657B
26 January 2011
SUPERSEDING
MIL-PRF-19500/657A
22 February 2000

* PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, FIELD EFFECT, RADIATION HARDENED, TRANSISTOR DIE, N AND P-CHANNEL, SILICON VARIOUS TYPES JANHC AND JANKC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

* The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19500.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for N and P-channel, enhancement-mode, MOSFET, radiation hardened, power transistor die. Two levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

* 1.2 Physical dimensions. See figures 1 through 8 herein.

1.3 Maximum ratings. See the applicable performance specification sheet from table I herein.

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

* 2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

* DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

* DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-750 - Test Methods for Semiconductor Devices.

* (Copies of these documents are available online at https://assist.daps.dla.mil/quicksearch/ or https://assist.daps.dla.mil/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

* Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.daps.dla.mil/.

* 2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable Qualified Manufacturer's List (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

* 3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 through 8 herein.

3.4.1 Lead finish, material, and thickness. The metallization shall be aluminum for the top and chrome-nickel-silver for the bottom. The nominal thickness of top metallization shall be 3 µm (4 µm nominal for all 60V die). The nominal thickness of back metallization shall be 0.55 µm.

3.5 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection.

* 3.5.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. However, the following handling practices are recommended (see 3.5).

a. Devices should be handled on benches with conductive handling devices.

b. Ground test equipment, tools, and personnel handling devices.

c. Do not handle devices by the leads.

d. Store devices in conductive foam or carriers.

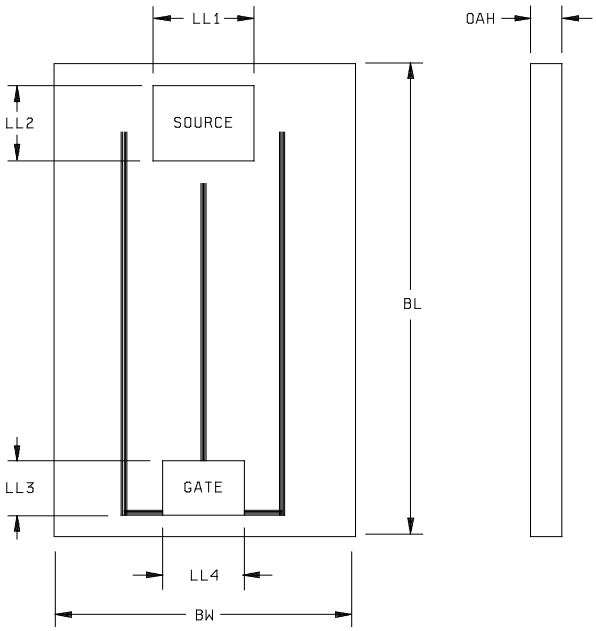
e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent if practical.

g. Care should be exercised during test and troubleshooting to apply not more than maximum rated voltage to any lead.

h. Gate must be terminated to source, $R \leq 100$ kΩ, whenever bias voltage is to be applied drain to source.

2N7261, 2N7262, 2N7380, 2N7381, 2N7382, 2N7383, 2N7389, 2N7390

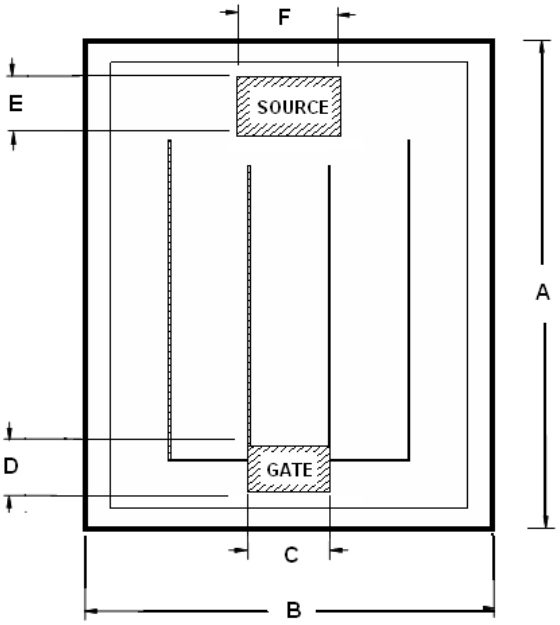


	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
*	BL	.173	.189	4.39	4.80
	BW	.108	.124	2.74	3.15
	OAH	.0145	.0175	0.368	0.445
*	LL1	.042	.044	1.07	1.12
*	LL2	.029	.031	0.74	0.79
	LL3	.0195	.0205	0.495	0.521
*	LL4	.026	.028	0.66	0.71

NOTES:
1. Dimensions are in inches.
* 2. Millimeters are given for general information only.

* FIGURE 1. JANHCA and JANKCA (A-version) die dimensions for 2N7261, 2N7262, 2N7380, 2N7381, 2N7382, 2N7383, 2N7389, and 2N7390.

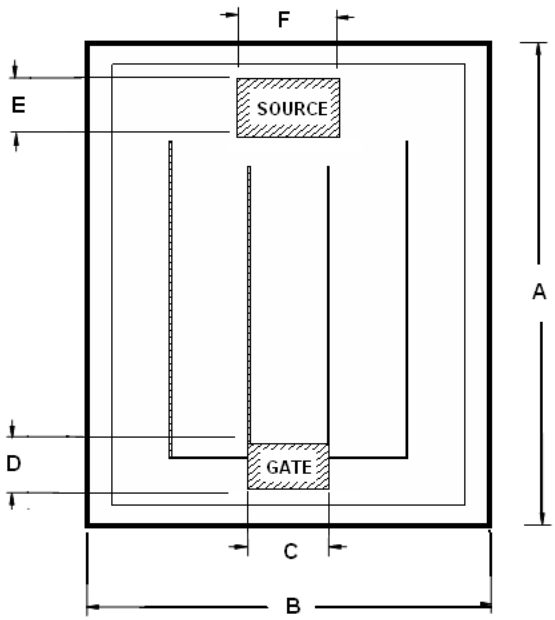
2N7261, 2N7262, 2N7380, 2N7381



Ltr	Dimensions - 2N7261, 2N7380				Dimensions - 2N7262, 2N7381			
	Inches		Millimeters		Inches		Millimeters	
	Min	Max	Min	Max	Min	Max	Min	Max
A	.181	.185	4.60	4.70	.179	.183	4.55	4.65
B	.116	.120	2.95	3.05	.114	.118	2.90	3.00
C	.032	.034	.81	.86	.028	.030	.71	.76
D	.017	.019	.43	.48	.018	.020	.46	.51
E	.024	.026	.61	.66	.024	.026	.61	.66
F	.035	.037	.89	.94	.033	.036	.84	.91

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
4. The physical characteristics of the die are: The back metals are chromium, nickel, and silver and the back contact is the drain. The top metal is aluminum.
5. Die thickness is .015 inch (0.38 mm) ±.001 inch (0.025 mm).

* FIGURE 2. JANHCB and JANKCB (B-version) die dimensions for 2N7261, 2N7262, 2N7380 and 2N7381.

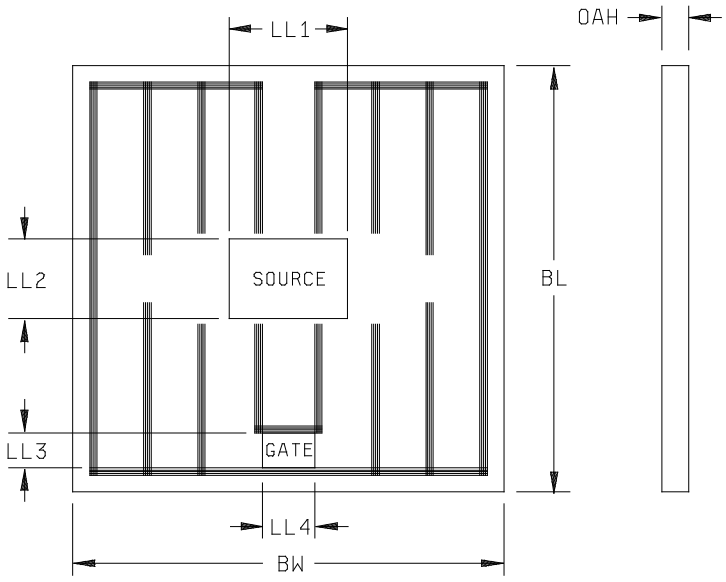


Ltr	Dimensions - 2N7382, 2N7389			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.181	.185	4.60	4.70
B	.116	.120	2.95	3.05
C	.032	.034	.81	.86
D	.017	.019	.43	.48
E	.024	.026	.61	.66
F	.035	.037	.89	.94

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
4. The physical characteristics of the die are: The back metals are chromium, nickel, and silver and the back contact is the drain. The top metal is aluminum.
5. Die thickness is .015 inch (0.38 mm) ±.001 inch (0.025 mm).

* FIGURE 3. JANHCB and JANKCB (B-version) die dimensions for 2N7382, 2N7389

2N7268, 2N7269, 2N7394, 2N7422, 2N7423

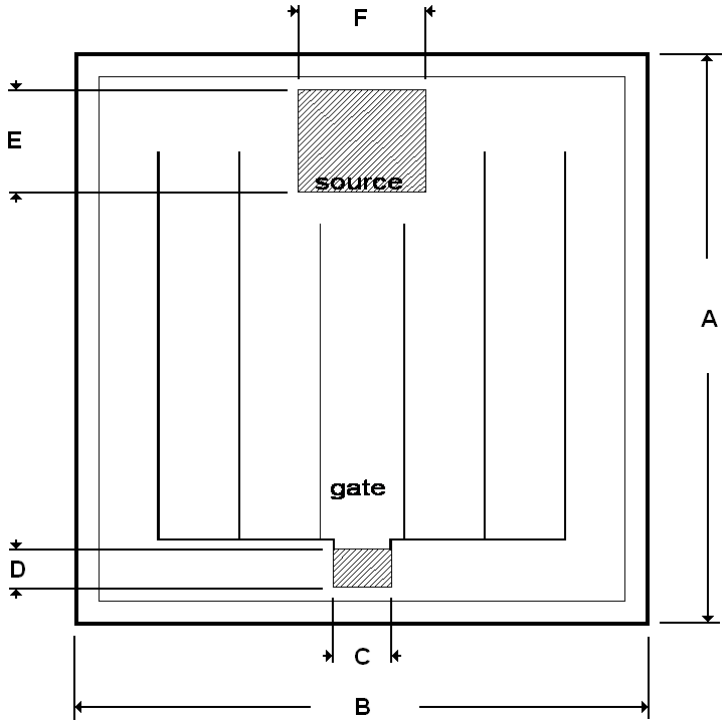


	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
*	BL	.249	.265	6.33	6.74
*	BW	.249	.265	6.33	6.74
	OAH	.0145	.0175	0.368	0.445
*	LL1	.069	.071	1.75	1.80
	LL2	.047	.049	1.19	1.25
	LL3	.0205	.0215	0.520	0.550
*	LL4	.03	.032	0.76	0.81

NOTES:
1. Dimensions are in inches.
* 2. Millimeters are given for general information only.

* FIGURE 4. JANHC and JANKC A-version die dimensions for 2N7268, 2N7269, 2N7394, 2N7422, and 2N7423.

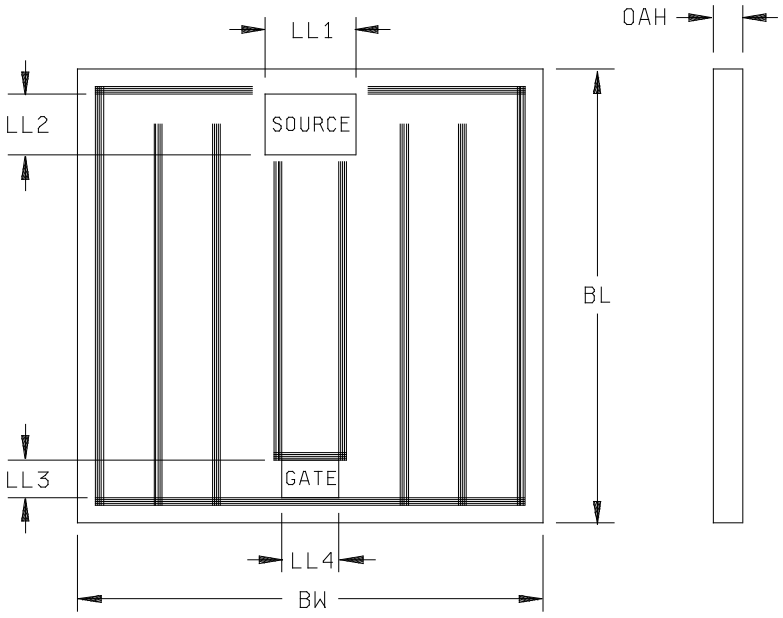
2N7268 and 2N7269



Ltr	Dimensions - 2N7268 and 2N7269			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.254	.260	6.45	6.60
B	.254	.260	6.45	6.60
C	.028	.033	.71	.84
D	.017	.022	.43	.56
E	.047	.053	1.19	1.35
F	.059	.065	1.50	1.65

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
4. The physical characteristics of the die are: The back metals are chromium, nickel, and silver and the back contact is the drain. The top metal is aluminum.
5. Die thickness is .015 inch (0.38 mm) ±.001 inch (0.025 mm).

* FIGURE 5. JANHCB and JANKCB (B-version) die dimensions for 2N7268 and 2N7269

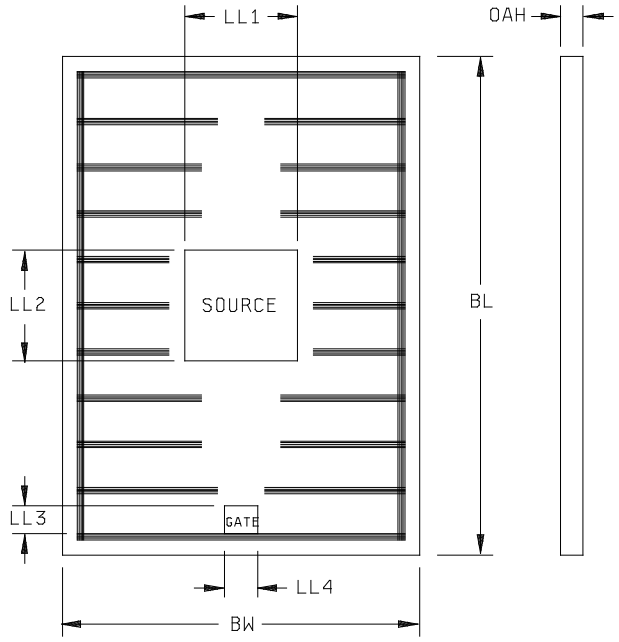


	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
*	BL	.249	.265	6.33	6.73
*	BW	.249	.265	6.33	6.73
*	OAH	.0155	.0185	0.394	0.470
*	LL1	.048	.050	1.22	1.27
*	LL2	.033	.035	0.84	0.89
	LL3	.0205	.0215	0.520	0.550
*	LL4	.03	.032	0.76	0.81

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.

* FIGURE 6. JANHC and JANKC A-version die dimensions for 2N7270.

2N7424, 2N7425, 2N7426, 2N7431, 2N7432, 2N7433, 2N7434, 2N7444

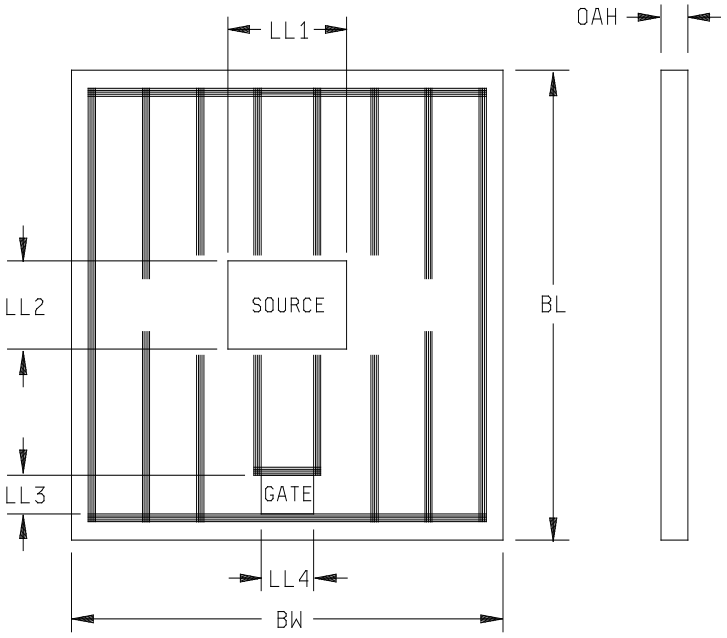


	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
	BL	.352	.368	8.94	9.35
*	BW	.249	.265	6.33	6.73
	OAH	.0145	.0175	0.368	0.445
*	LL1	.079	.081	2.01	2.06
*	LL2	.079	.081	2.01	2.06
	LL3	.0195	.0205	0.495	0.521
*	LL4	.0231	.0241	0.587	0.612

NOTES:
1. Dimensions are in inches.
* 2. Millimeters are given for general information only.

* FIGURE 7. JANHC and JANKC A-version die dimensions for 2N7424, 2N7425, 2N7426, 2N7431, 2N7432, 2N7433, 2N7434, and 2N7444.

2N7391, 2N7392



	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
	BL	.352	.368	8.94	9.35
*	BW	.249	.265	6.33	6.73
	OAH	.0145	.0175	0.368	0.445
*	LL1	.064	.066	1.63	1.68
	LL2	.050	.052	1.27	1.32
	LL3	.0205	.0215	0.52	0.55
*	LL4	.030	.032	0.76	0.81

NOTES:
1. Dimensions are in inches.
* 2. Millimeters are given for general information only.

* FIGURE 8. JANHC and JANKC A-version die dimensions for 2N7391 and 2N7392.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in the applicable associated performance specification listed in table I herein.

* TABLE I. Applicable performance specification sheet.

Type	Performance specification sheet	Reference data			Figure
		Voltage (V dc)	Channel	Size	
2N7261 or 2N7261U	MIL-PRF-19500/601	100	N	3	1, 2
2N7262 or 2N7262U	MIL-PRF-19500/601	200	N	3	1, 2
2N7394 or 2N7394U	MIL-PRF-19500/603	60	N	5	4
2N7268 or 2N7268U	MIL-PRF-19500/603	100	N	5	4, 5
2N7269 or 2N7269U	MIL-PRF-19500/603	200	N	5	4, 5
2N7270 or 2N7270U	MIL-PRF-19500/603	500	N	5	6
2N7380	MIL-PRF-19500/614	100	N	3	1, 2
2N7381	MIL-PRF-19500/614	200	N	3	1, 2
2N7382	MIL-PRF-19500/615	100	P	3	1, 3
2N7383	MIL-PRF-19500/615	200	P	3	1
2N7389 or 2N7389U	MIL-PRF-19500/630	100	P	3	1, 3
2N7390 or 2N7390U	MIL-PRF-19500/630	200	P	3	1
2N7424U	MIL-PRF-19500/655	60	P	6	7
2N7425U	MIL-PRF-19500/655	100	P	6	7
2N7426U	MIL-PRF-19500/655	200	P	6	7
2N7424	MIL-PRF-19500/660	60	P	6	7
2N7425	MIL-PRF-19500/660	100	P	6	7
2N7426	MIL-PRF-19500/660	200	P	6	7
2N7444	MIL-PRF-19500/661	200	N	6	7
2N7434	MIL-PRF-19500/661	250	N	6	7
2N7391	MIL-PRF-19500/661	400	N	6	8
2N7392	MIL-PRF-19500/661	500	N	6	8
2N7422 or 2N7422U	MIL-PRF-19500/662	100	P	5	4
2N7423 or 2N7423U	MIL-PRF-19500/662	200	P	5	4
2N7431	MIL-PRF-19500/663	60	N	6	7
2N7432	MIL-PRF-19500/663	100	N	6	7
2N7433	MIL-PRF-19500/663	200	N	6	7
2N7431U	MIL-PRF-19500/664	60	N	6	7
2N7432U	MIL-PRF-19500/664	100	N	6	7
2N7433U	MIL-PRF-19500/664	200	N	6	7

3.7 Marking. Marking shall be in accordance with MIL-PRF-19500. At the option of the manufacturer, marking may be omitted from the body, but shall be retained on the initial container.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (element evaluation) (see 4.2).

b. Conformance inspection (see 4.3)

4.2 Qualification inspection (element evaluation). Qualification inspection (element evaluation) shall be in accordance with MIL-PRF-19500, appendix G, and the applicable associated performance specification from table I herein.

4.3 Conformance inspection (group D). Conformance inspection (group D) shall be conducted in accordance with table E-VIII of MIL-PRF-19500 and the applicable associated performance specification from table I herein.

4.4 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.4.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

5. PACKAGING

* 5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

* (This section contains information of a general or explanatory nature that may be helpful, but is not mandatory. The notes specified in MIL-PRF-19500 are applicable to this specification.)

* 6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

* 6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Packaging requirements (see 5.1).

c. Lead finish (see 3.4.1).

* d. Specify the JANHC or JANKC letter version (see figures 1, 2, 3, 4, 5, 6, 7, and 8).

* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.daps.dla.mil .

6.4 Cross reference list. The following chart shows the generic P/N and its associated military P/N (without the JAN or RHA prefix). Multiple military part numbers indicate that the same die type is used on more than one performance specification sheet.

Military P/N	Generic P/N
2N7261, 2N7261U and 2N7380	IRHCX130 (1)
2N7262, 2N7262U and 2N7381	IRHCX230 (1)
2N7382, 2N7389 and 2N7389U	IRHC9Y130 (2)
2N7383, 2N7390 and 2N7390U	IRHC9Y230 (2)
2N7394 and 2N7394U	IRHCX054 (1)
2N7268 and 2N7268U	IRHCX150 (1)
2N7269 and 2N7269U	IRHCX250 (1)
2N7270 and 2N7270U	IRHCX450 (1)
2N7424 and 2N7424U	IRHC9Y064 (2)
2N7425 and 2N7425U	IRHC9Y160 (2)
2N7426 and 2N7426U	IRHC9Y260 (2)
2N7444	IRHC7260SE
2N7434	IRHC7264SE
2N7391	IRHC7360SE
2N7392	IRHC7460 SE
2N7422 and 2N7422U	IRHC9Y150 (2)
2N7423 and 2N7423U	IRHC9Y250 (2)
2N7431 and 2N7431U	IRHCX064 (1)
2N7432 and 2N7432U	IRHCX160 (1)
2N7433 and 2N7433U	IRHCX260 (1)

(1) Replace X with number indicating qualified rad hardness as follows:
- 7 = 100K rad (Si) equivalent to RHA designator R.
- 3 = 300K rad (Si) equivalent to RHA designator F.
- 4 = 600K rad (Si) equivalent to RHA designator G.
- 8 = 1,000K rad (Si) equivalent to RHA designator H.

(2) Replace Y with number indicating qualified rad hardness as follows:
- Blank = 100K rad (Si) equivalent to RHA designator R.
- 3 = 300K rad (Si) equivalent to RHA designator F.

* 6.5 Suppliers of JANHC and JANKC die. The qualified die suppliers with the applicable letter version (example, JANHCA2N7261) will be identified on the QML.

JANC ordering information		
Type	Manufacturer	
	59993	43611
2N7261, 2N7261U	JANHCAR2N7261, JANKCAR2N7261 JANHCAF2N7261, JANKCAF2N7261 JANHCAG2N7261, JANKCAG2N7261 JANHCAH2N7261, JANKCAH2N7261	JANHCBR2N7261, JANKCBR2N7261 JANHCBF2N7261, JANKCBF2N7261
2N7262, 2N7262U	JANHCAR2N7262, JANKCAR2N7262 JANHCAF2N7262, JANKCAF2N7262 JANHCAG2N7262, JANKCAG2N7262 JANHCAH2N7262, JANKCAH2N7262	JANHCBR2N7262, JANKCBR2N7262 JANHCBF2N7262, JANKCBF2N7262
2N7394, 2N7394U	JANHCAR2N7394, JANKCAR2N7394 JANHCAF2N7394, JANKCAF2N7394 JANHCAG2N7394, JANKCAG2N7394 JANHCAH2N7394, JANKCAH2N7394	
2N7268, 2N7268U	JANHCAR2N7268, JANKCAR2N7268 JANHCAF2N7268, JANKCAF2N7268 JANHCAG2N7268, JANKCAG2N7268 JANHCAH2N7268, JANKCAH2N7268	JANHCBR2N7268, JANKCBR2N7268 JANHCBF2N7268, JANKCBF2N7268
2N7269, 2N7269U	JANHCAR2N7269, JANKCAR2N7269 JANHCAF2N7269, JANKCAF2N7269 JANHCAG2N7269, JANKCAG2N7269 JANHCAH2N7269, JANKCAH2N7269	JANHCBR2N7269, JANKCBR2N7269 JANHCBF2N7269, JANKCBF2N7269
2N7270, 2N7270U	JANHCAR2N7270, JANKCAR2N7270 JANHCAF2N7270, JANKCAF2N7270 JANHCAG2N7270, JANKCAG2N7270 JANHCAH2N7270, JANKCAH2N7270	
2N7380	JANHCAR2N7380, JANKCAR2N7380 JANHCAF2N7380, JANKCAF2N7380 JANHCAG2N7380, JANKCAG2N7380 JANHCAH2N7380, JANKCAH2N7380	JANHCBR2N7380, JANKCBR2N7380 JANHCBF2N7380, JANKCBF2N7380
2N7381	JANHCAR2N7381, JANKCAR2N7381 JANHCAF2N7381, JANKCAF2N7381 JANHCAG2N7381, JANKCAG2N7381 JANHCAH2N7381, JANKCAH2N7381	JANHCBR2N7381, JANKCBR2N7381 JANHCBF2N7381, JANKCBF2N7381
2N7382	JANHCAR2N7382, JANKCAR2N7382 JANHCAF2N7382, JANKCAF2N7382	JANHCBR2N7382, JANKCBR2N7382 JANHCBF2N7382, JANKCBF2N7382
2N7383	JANHCAR2N7383, JANKCAR2N7383 JANHCAF2N7383, JANKCAF2N7383	
2N7389, 2N7389U	JANHCAR2N7389, JANKCAR2N7389 JANHCAF2N7389, JANKCAF2N7389	JANHCBR2N7389, JANKCBR2N7389 JANHCBF2N7389, JANKCBF2N7389
2N7390, 2N7390U	JANHCAR2N7390, JANKCAR2N7390 JANHCAF2N7390, JANKCAF2N7390	
2N7424, 2N7424U	JANHCAR2N7424, JANKCAR2N7424 JANHCAF2N7424, JANKCAF2N7424	
2N7425, 2N7425U	JANHCAR2N7425, JANKCAR2N7425 JANHCAF2N7425, JANKCAF2N7425	

JANC ordering information - Continued.		
Type	Manufacturer	
	59993	43611
2N7426, 2N7426U	JANHCAR2N7426, JANKCAR2N7426 JANHCAF2N7426, JANKCAF2N7426	
2N7444	JANHCAR2N7444, JANKCAR2N7444	
2N7434	JANHCAR2N7434, JANKCAR2N7434	
2N7391	JANHCAR2N7391, JANKCAR2N7391	
2N7392	JANHCAR2N7392, JANKCAR2N7392	
2N7422, 2N7422U	JANHCAR2N7422, JANKCAR2N7422 JANHCAF2N7422, JANKCAF2N7422	
2N7423, 2N7423U	JANHCAR2N7423, JANKCAR2N7423 JANHCAF2N7423, JANKCAF2N7423	
2N7431, 2N7431U	JANHCAR2N7431, JANKCAR2N7431 JANHCAF2N7431, JANKCAF2N7431 JANHCAG2N7431, JANKCAG2N7431 JANHCAH2N7431, JANKCAH2N7431	
2N7432, 2N7432U	JANHCAR2N7432, JANKCAR2N7432 JANHCAF2N7432, JANKCAF2N7432 JANHCAG2N7432, JANKCAG2N7432 JANHCAH2N7432, JANKCAH2N7432	
2N7433, 2N7433U	JANHCAR2N7433, JANKCAR2N7433 JANHCAF2N7433, JANKCAF2N7433 JANHCAG2N7433, JANKCAG2N7433 JANHCAH2N7433, JANKCAH2N7433	

* 6.6 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Army - CR
Navy - EC
Air Force - 85
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

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* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.daps.dla.mil/ .